

**Fibre Optical SDI Converter
and
Multiformat Optical to Electrical
Converter Non-reclocked**

Revision history

The latest version is always available in pdf-format on our web-site:

<http://www.network-electronics.com/>

Current revision of this document is the uppermost in the table below.

Revision	Replaces	Date	Change Description
9	8	2007-10-29	New front page.
8	7	2007-09-07	Added Materials Declaration and EFUP; updated EC Declaration of Conformity.
7	6	2007-02-16 NBS	Updated GPI and LED information.
6	5	2006-12-15 GMW	Changed maximum optical input power to -6 on SDI-OE-L
5	4	07.04.06 NBS	Corrected <i>LOS</i> (LED) description in Chapter 4.2.
4	3	29.06.04 LEE	Corrected specifications
3	2	02.12.03 AR	Corrected GPI table.
2	1	18.08.03 RS	Added improved NRC version, corrected bit rate specification and input power range for SDI-versions
1	0	08.05.01 RS	Removed NRC version, added –S and –L versions, new laser classification
0	A	15.12.00 NBS	Renamed Optronics to Electronics & Rev. Control
A	-	25.06.00 RS	Initial Revision

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1. General

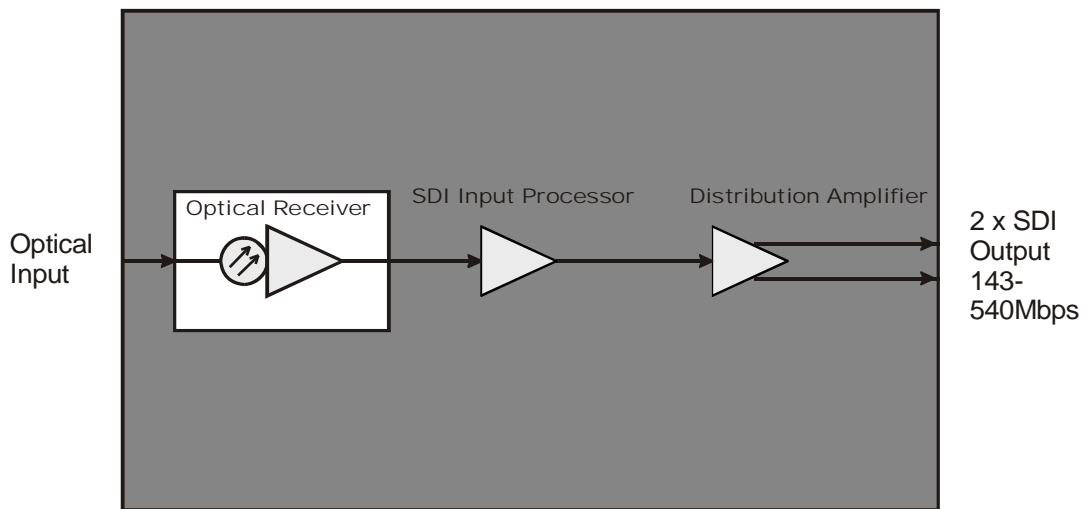


Figure 1 : Block diagram of the processes inside the SDI-OE-S/SDI-OE-L

The **flashlink**® Optical to SDI converter is a multi bit rate converter module for use together with the SDI-OE-C1 connector module. The unit can handle bit rates from 19.4Mbps up to 540Mbps. The input sensitivity is typically better than –30dBm in the long haul version. This will typically result in more than 60km of high quality of single mode fiber at 270Mbps.

The optical input is made with a PIN photodiode for reception in the 2nd and 3rd optical window (1200-1620nm including CWDM and DWDM wavelengths). The optical input is according to SMPTE-297M for the SDI versions.

The SDI-OE has 2 SDI outputs for DA use.

The product is also available as a non-reclocked version for transport of other signals than SDI from 1 Mbps to 540Mbps.

The product is available in 3 versions:

- One for short haul (-S) applications,
- One for long haul (-L) applications and
- One without re-clocking for other signals than SDI up to 540Mbps:

SDI-OE-S	Input power -6 dBm to –20 dBm with re-clocking
SDI-OE-L	Input power -6 dBm to –30 dBm with re-clocking
MF-OE-NRC	Input power -6 dBm to –25 dBm without re-clocking

2. Specifications

Optical Input, SDI version

Data rate optical:	19.4Mbps – 540Mbps
Sensitivity, SDI-OE-S:	Better than –20dBm
Maximum input power, SDI-OE-S:	0 dBm
Detector overload threshold, SDI-OE-S:	min. –6dBm, typ. –3dBm
Sensitivity, SDI-OE-L:	better than –30dBm
Maximum input power, SDI-OE-L:	0 dBm
Detector overload threshold, SDI-OE-L:	min. -6dBm, typ -3dBm
Optical wavelengths:	2 nd & 3 rd opt. windows, 1200-1620 nm
Transmission Circuit Fiber	Multi Mode 50/125µm, Single Mode compatible
Return loss (connector):	better than 40 dB w/Single Mode fiber (typ.)
Connector	SC/UPC

Optical Input, non-reclocked version

Data rate optical:	1Mbps – 540Mbps
Sensitivity MF-OE-NRC:	better than –25dBm typ.
Maximum input power MF-OE-NRC:	-6 dBm
Optical wavelengths:	2 nd & 3 rd opt. windows, 1200-1620 nm
Transmission Circuit Fiber	Multi Mode 50/125µm, Single Mode compatible
Return loss (connector):	better than 40 dB w/Single Mode fiber (typ.)
Detector overload threshold:	min. –6dBm, typ. –3dBm
Connector	SC/UPC

Electrical

Power:	+ 5V DC / 1.7W
Control:	Control system for access to set-up and module status with BITE (Built-In Test Equipment).

SDI Output

Number of outputs:	2
Connector:	BNC
Impedance:	75 ohm
Return loss:	> 15dB @270MHz
Signal level:	nom. 800mV
Rise/fall time:	typ. 650ps
Jitter (UI= Unit Interval):	0.2 UI max.

Non-reclocked output

Number of outputs:	2
Connector:	BNC
Impedance:	75 ohm

3. Connector module

The SDI-OE-S/SDI-OE-L has a dedicated connector module: SDI-OE-C1.
This module is mounted at the rear of the sub-rack.
The module is shown in figure 2.

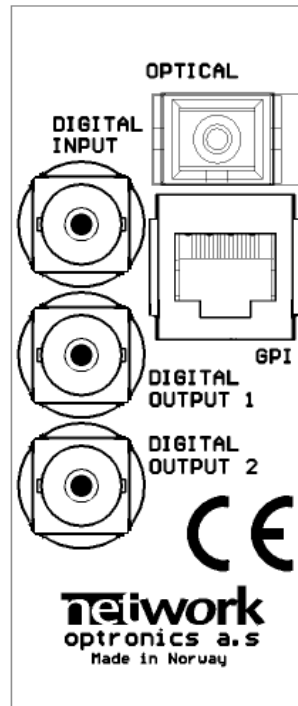


Figure 2. Overview of the SDI-OE-C1 connector module

3.1 Mounting the connector module.

This section only applies if the module is not purchased pre-mounted in a sub-rack.
The details of how the connector module is mounted, is found in the user manual for the sub-rack frame FR-2RU-10-2.

This manual is also available from our web site: <http://www.network-electronics.com/>

3.2 Applying signals to the connector module

Apply the optical SDI-signal to the optical input connection.

The BNC digital input is disabled at the SDI-OE-C1 connector module.
There are two digital output-BNCs. The digital SDI-signal is the same at both outputs.

The optical input is an SC/UPC connector with a return loss better than 40dB typ.

4. Module status

The status of the module can be monitored in three ways.

1. Gyda-SC controller.
2. GPI at the rear of the sub-rack.
3. LED's at the front of the sub-rack.

Of these three, the GPI and the LED's are mounted on the module itself, whereas the Gyda-SC controller is a separate module giving detailed information of the status of the card. The functions of the GPI and the LED's are described in sections 4.1 and 4.2. The Gyda-SC controller is described in a separate user manual.

4.1 GPI – Module Status Outputs

These outputs can be used for wiring up alarms for third party control systems. The GPI outputs are open collector outputs, sinking to ground when an alarm is triggered. The GPI connector is shown in figure 2.

Electrical Maximums for GPI outputs

Max current: 100mA

Max voltage: 30V

SDI-OE-C1 GPI pin layout:

Signal	Name	Pin #	Mode
Status	General error status for the module.	Pin 1	Open Collector
LOS	Modulated optical input signal is missing.	Pin 2	Open Collector
LOCK	Re-clocker is in lock on a supported signal format. (Not applicable for the non-reclocked version)	Pin 3	Open Collector
Ground	0 volt pin	Pin 8	0V.

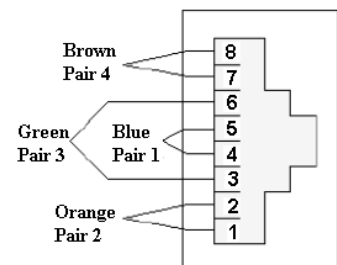


Figure 3: GPI Outlet

4.2 Front Panel - Status Monitoring

The status of the module can be easily monitored visually by the LED's at the front of the module. The LED's are visible through the front panel as shown in figure 4.

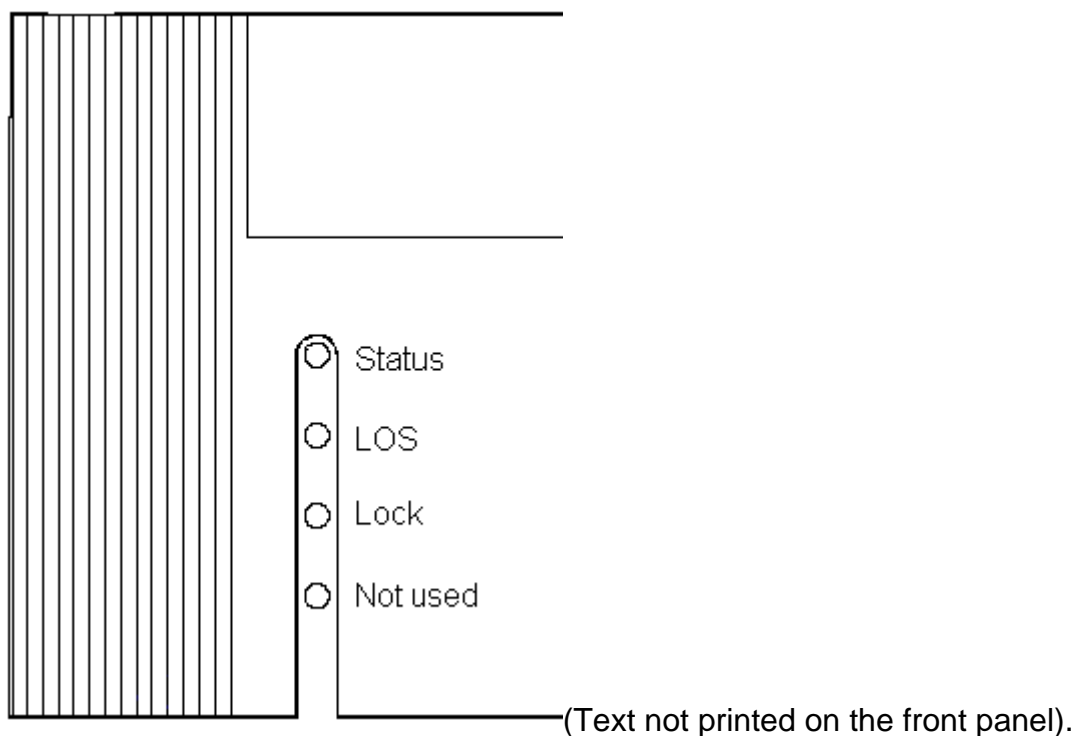


Figure 4 Diode overview of SDI-OE

The SDI-OE has 3 LED's each showing a status corresponding to the GPI pinning. The position of the different LED's is shown in figure 4.

Diode \ state	Red LED	Green LED	No light
Status	Module is faulty	Module is OK Module power is OK	Module has no power
LOS	Loss of signal No modulated optical input signal.	Optical input (modulated SDI) signal present	
Lock (Not applicable for the non-reclocked version)	Re-clocker is not locked	Re-clocker locked	

5. Laser safety precautions

Guidelines to limit hazards from laser exposure.

All the available EO units in the flashlink® range include a laser.

Therefore this note on laser safety should be read thoroughly.

The lasers emit light at 1310 nm or 1550 nm. This means that the human eye cannot see the beam, and the blink reflex can not protect the eye. (The human eye can see light between 400 nm to 700 nm).

A laser beam can be harmful to the human eye (depending on laser power and exposure time), therefore:

!! BE CAREFUL WHEN CONNECTING / DISCONNECTING FIBER PIGTAILS (ENDS).

NEVER LOOK DIRECTLY INTO THE PIGTAIL OF THE LASER/FIBER.

NEVER USE MICROSCOPES, MAGNIFYING GLASSES OR EYE LOUPES TO LOOK INTO A FIBER END.

USE LASER SAFETY GOGGLES BLOCKING LIGHT AT 1310 nm AND AT 1550 nm.

Instruments exist to verify light output power: Power meters, IR-cards etc.

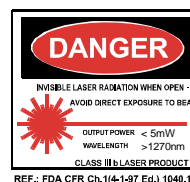
Flashlink® features:

The FR-2RU-10-2 is classified as Class 1 laser product according to EN 60 825-1:94/A11:96, and CFR Ch1(1997) Part 1040.10.

If the front panel is removed, the FR-2RU-10-2 is classified as Class 1 laser product according to EN 60 825-1:94/A11:96, and class IIb according to CFR Ch1(1997) Part 1040.10.

Maximum output power: 5 mW.

Operating wavelengths: 1310 nm or 1550 nm.



General environmental requirements for flashlink[®] equipment

1. The equipment will meet the guaranteed performance specification under the following environmental conditions:
 - Operating room temperature range 0°C to 50°C
 - Operating relative humidity range up to 90% (non-condensing)

2. The equipment will operate without damage under the following environmental conditions:
 - Temperature range -10°C to 55°C
 - Relative humidity range up to 95% (non-condensing)

Product Warranty

The warranty terms and conditions for the product(s) covered by this manual follow the General Sales Conditions by Network Electronics ASA. These conditions are available on the company web site of Network Electronics ASA:

www.network-electronics.com

Materials declaration and recycling information

Materials declaration

For product sold into China after 1st March 2007, we comply with the “Administrative Measure on the Control of Pollution by Electronic Information Products”. In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
SDI-OE	X	O	O	O	O	O
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.						
X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.						

Environmentally-friendly use period

The manual must include a statement of the “environmentally friendly use period”. This is defined as the period of normal use before any hazardous material is released to the environment. The guidance on how the EFUP is to be calculated is not finalised at the time of writing. See

<http://www.aeanet.org/GovernmentAffairs/qfLeOpAaZXaMxqGjSFbEidSdPNtpT.pdf> for an unofficial translation of the draft guidance. For our own products, Network Electronics has chosen to use the 50 year figure recommended in this draft regulation.

Network Electronics suggests the following statement on An “Environmentally Friendly Use Period” (EFUP) setting out normal use:

EFUP is the time the product can be used in normal service life without leaking the hazardous materials. We expect the normal use environment to be in an equipment room at controlled temperature range (0°C - 40°C) with moderate humidity (< 90%, non-condensing) and clean air, not subject to vibration or shock.

Further, a statement on any hazardous material content, for instance, for a product that uses some tin/lead solders:

Where a product contains potentially hazardous materials, this is indicated on the product by the appropriate symbol containing the EFUP. The hazardous material content is limited to lead (Pb) in some solders. This is extremely stable in normal use and the EFUP is taken as 50 years, by comparison with the EFUP given for Digital Exchange/Switching Platform in equipment in Appendix A of “General Rule of Environment-Friendly Use Period of Electronic Information Products”. This is indicated by the product marking:



It is assumed that while the product is in normal use, any batteries associated with real-time clocks or battery-backed RAM will be replaced at the regular intervals.

The EFUP relates only to the environmental impact of the product in normal use, it does not imply that the product will continue to be supported for 50 years.

Recycling information

Network Electronics provides assistance to customers and recyclers through our web site <http://www.network-electronics.com>. Please contact Network Electronics' Customer Support for assistance with recycling if this site does not show the information you require.

Where it is not possible to return the product to Network Electronics or its agents for recycling, the following general information may be of assistance:

Before attempting disassembly, ensure the product is completely disconnected from power and signal connections.

All major parts are marked or labelled to show their material content.

Depending on the date of manufacture, this product may contain lead in solder.

Some circuit boards may contain battery-backed memory devices.

EC Declaration of Conformity

network

MANUFACTURER	Network Electronics ASA P.B. 1020, N-3204 SANDEFJORD, Norway	
AUTHORISED REPRESENTATIVE (Established within the EEA)	Not applicable	
MODEL NUMBER(S)	SDI-OE	
DESCRIPTION	Fiber Optical SDI Converter and Multiformat Optical to Electrical Converter Non-reclocked	
DIRECTIVES this equipment complies with	LVD 73/23/EEC EMC 89/336/EEC	
HARMONISED STANDARDS applied in order to verify compliance with Directive(s)	EN 55103-1:1996 EN 55103-2:1996 EN 60950-1:2006	
TEST REPORTS ISSUED BY	Notified/Competent Body	Report no:
	Nemko	200013115
TECHNICAL CONSTRUCTION FILE NO	Not applicable	
YEAR WHICH THE CE-MARK WAS AFFIXED	2000	
TEST AUTHORIZED SIGNATORY		
MANUFACTURER	AUTHORISED REPRESENTATIVE (Established within EEA)	Date of Issue
		2007-09-07
		Place of Issue
		Sandefjord, Norway
	Not applicable	
Name	Thomas Øhrbom	
Position	Quality Manager (authorised signature)	


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